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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--------------------------------------------------------------------------------------------------------------------|-------------|----------------------|----------------------------------|------------------------|
| 10/590,081 | 08/21/2006 | Mitsuru Yamamoto | Q96217 | 4161 |
| 23373 7590 02/14/2008 SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037 | | | EXAMINER ROSENATH, DEREK JOHN | |
| | | | ART UNIT 2834 | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/590,081

Applicant(s)

YAMAMOTO ET AL.

Examiner

Derek J. Rosenau

Art Unit

2834

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 August 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-8508)
- Paper No(s)/Mail Date 8/21/06
- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date _____
- 5) ☐ Notice of Inventor's Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 23d. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: at page 14, line 13 "23c is a second capacitor" should be "23d is a second capacitor".

Appropriate correction is required.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in

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upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Senda et al. (US 2002/0008439) in view of Honda et al. ("Class D Audio Amplifier Design"), Ishii et al. (US 2006/0132231), Nakano et al. (US 2002/0033322), and Katsumi et al. (JP 2001-355574).

5. With respect to claim 14, Senda et al. discloses a piezoelectric pump drive circuit comprising: a sine wave oscillation means (Fig 1, items 104 and 105) for generating a sine wave signal of the frequency that drives a piezoelectric element (Paragraph 41); an amplification means (item 106) for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave (Fig 1); a first control means for implementing variable frequency control at the time of activation of said sine wave oscillation means (Paragraphs 52-54); and a temperature sensing means for sensing temperature (item 112).

Senda et al. does not disclose expressly a cooling system comprising: a voltage-boosting means for converting a low-voltage power supply to a high voltage; an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means for driving said piezoelectric element by a high-voltage sine wave; a second control means for adjusting the signal amplitude of said sine wave oscillation means in accordance with the sensed temperature of said temperature sensing means; wherein said amplification means is composed of: a D-class amplifier driven by a high voltage generated by said voltage-boosting means for subjecting the signal supplied as output from said sine wave oscillation means to pulse-width modulation to realize amplification; a low pass filter for demodulating the output signal of said D-class amplifier; a heat sink that contacts a heat-generating body; a radiator for radiating heat to the outside; coolant circulation passages connected such that coolant circulates between said heat sink and

said radiator; or a piezoelectric pump that is driven by said piezoelectric pump drive circuit for circulating coolant in said coolant circulating passages.

Honda et al. teaches an amplification means driven by a voltage supply for amplifying a signal supplied as output from a sine wave oscillation means and for driving an output by a high-voltage sine wave (page 5); wherein said amplification means is composed of: a D-class amplifier (pages 4-7) driven by a voltage generated from a voltage supply for subjecting the signal supplied as output from the sine wave oscillation means to pulse-width modulation to realize amplification (page 5); and a low-pass filter for demodulating the output signal of said D-class amplifier (page 5).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the D-class amplifier of Honda et al. with the piezoelectric drive circuit of Senda et al. for the benefit of improved efficiency (page 2 of Honda et al.).

Ishii et al. teaches an amplification means including a D-class amplifier driven by a high voltage generated from a voltage-boosting means for converting a low-voltage power supply to a high voltage (Paragraph 36).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the voltage-boosting means of Ishii et al. with the piezoelectric drive circuit of Senda et al. for the benefit of being able to use a lower-voltage power supply for the amplification means.

Nakano et al. teaches a piezoelectric drive circuit that includes a temperature sensing means for sensing temperature and a second control means for adjusting the

signal amplitude of a sine wave oscillation means in accordance with the sensed temperature of said temperature sensing means (Paragraph 17).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the control means of Nakano et al. with the piezoelectric drive circuit of Senda et al. for the benefit of providing additional compensation due to fluctuations in temperature (Paragraph 17 of Nakano et al.).

Katsumi et al. teaches a cooling system (Abstract) comprising: a piezoelectric pump drive circuit (Abstract) comprising: a heat sink (Abstract, item 3) that contacts a heat-generating body (Abstract, item 4); a radiator for radiating heat to the outside (Abstract, item 5); coolant circulation passages connected such that coolant circulates between said heat sink and said radiator (Abstract); and a piezoelectric pump that is driven by said piezoelectric pump drive circuit for circulating coolant in said coolant circulation passages (Abstract).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the cooling system of Katsumi et al. with the piezoelectric drive circuit of Senda et al. for the benefit of incorporating the temperature-compensated drive circuit of Senda et al. into the cooling system of Katsumi et al.

6. With respect to claims 11-13, the subject matter therein are rearrangements of the subject matter in claims 14; therefore, claims 11-13 are unpatentable over Senda et al. in view of Honda et al., Ishii et al., Nakano et al., and Katsumi et al. for the same reasons as above.

7. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Senda et al. in view of Honda et al. and Ishii et al.
8. With respect to claims 1-3, the subject matter therein are rearrangements of the subject matter in claims 14; therefore, claims 1-3 are unpatentable over Senda et al. in view of Honda et al. and Ishii et al. for the same reasons as above.
9. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Senda et al. in view of Honda et al., Ishii et al., and Nakano et al.
10. With respect to claims 4-7, the subject matter therein are rearrangements of the subject matter in claims 14; therefore, claims 4-7 are unpatentable over Senda et al. in view of Honda et al., Ishii et al. and Nakano et al. for the same reasons as above.
11. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Senda et al. in view of Honda et al., Ishii et al., and Katsumi et al.
12. With respect to claims 8-10, the subject matter therein are rearrangements of the subject matter in claims 14; therefore, claims 8-10 are unpatentable over Senda et al. in view of Honda et al., Ishii et al., and Katsumi et al. for the same reasons as above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is (571)272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Derek J Rosenau
Examiner
Art Unit 2834

/D. J. R./
Examiner, Art Unit 2834

/Darren Schuberg/
Supervisory Patent Examiner, Art Unit 2834